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07/964,362 10/21/92 KIM

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EVERHART, EXAMINER

D1M1/1021

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ART UNIT PAPER NUMBER

1104

6

DATE MAILED: 10/21/93

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☐ Responsive to communication filed on _____ ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), _____ days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

- ☒ Notice of References Cited by Examiner, PTO-892.
- ☒ Notice of Draftsman's Patent Drawing Review, PTO-948.
- ☒ Notice of Art Cited by Applicant, PTO-1449.
- ☐ Notice of Informal Patent Application, PTO-152.
- ☐ Information on How to Effect Drawing Changes, PTO-1474.
- ☐

Part II SUMMARY OF ACTION

- ☒ Claims 1, 2 are pending in the application.
Of the above, claims _____ are withdrawn from consideration.
- ☐ Claims _____ have been cancelled.
- ☐ Claims _____ are allowed.
- ☒ Claims 1, 2 are rejected.
- ☐ Claims _____ are objected to.
- ☐ Claims _____ are subject to restriction or election requirement.
- ☐ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.
- ☐ Formal drawings are required in response to this Office action.
- ☐ The corrected or substitute drawings have been received on _____ Under 37 C.F.R. 1.84 these drawings are ☐ acceptable; ☐ not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).
- ☐ The proposed additional or substitute sheet(s) of drawings, filed on _____, has (have) been ☐ approved by the examiner; ☐ disapproved by the examiner (see explanation).
- ☐ The proposed drawing correction, filed _____, has been ☐ approved; ☐ disapproved (see explanation).
- ☒ Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☒ been received ☐ not been received ☐ been filed in parent application, serial no. _____; filed on _____.
- ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
- ☐ Other

EXAMINER'S ACTION

Art Unit: 1104

The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Evaluations of the level of ordinary skill in the art requires consideration of such factors as various prior art approaches, types of problems encountered in the art, rapidity with which innovations are made, sophistication of technology involved, educational background of those actively working in the field, commercial success, and failure of others.

The "person having ordinary skill" in this art has the capability of understanding the scientific and engineering principles applicable to the claimed invention. The evidence of record including the references and/or the admissions are considered to reasonably reflect this level of skill.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103, the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 C.F.R. § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of potential 35 U.S.C. § 102(f) or (g) prior art under 35 U.S.C. § 103.

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Claims 1,2 are rejected under 35 U.S.C 103 as being unpatentable over the admitted prior art in view of Shishino(JA 0034929) and Tanaka(JA 0165320).

The admissions as to the prior art teachings are located at lower paragraph of page 1, and figures 1A and 1B of specification and which are: The selective deposition of tungsten thin films by chemical vapor deposition for the filling of contact holes or openings, and providing a silicon substrate that has a field oxide, a junction layer, and a gate electrode formed on it. Forming a first and a second insulating layers on the whole structure, then forming a contact hole by removing a portion of the first and second insulating layers to expose the junction layer and the gate electrode.

The differences between the admitted prior art and the claim(s) are as follows: Filling the contact hole by a method in which the selective tungsten thin films are deposited in two steps.

However, the Shishino reference teaches at the abstract that it known in the art to fill a contact hole with a metal or metals using a two step deposition process, while the Tanaka reference teaches at the abstract that it is known in the art to fill a contact hole by forming a first insulating layer on the substrate surface, removing a portion of the first insulating layer to expose the substrate surface, and filling the first contact hole

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with a metal; then forming a second insulating layer on the substrate surface, removing a portion of the second insulating layer to expose the first metal, and filling the second contact hole with a metal.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the admitted prior art by using a two step metal thin film deposition process to fill the contact hole as suggested by the Shishino reference because depositing the metal in two steps prevents short-circuiting and improves the reliability of the wiring, and to modified the admitted prior art by forming and filling the contact hole in two steps as suggested by the Tanaka reference because forming and filling the contact hole in two steps permits monitoring of contact formation.

Claim 2 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The exact order in which the contact holes are formed and filled is unclear from the claim language of claim 2.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to B. Everhart whose telephone number is (703) 308-0434.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0661.

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B. Everhart
B. Everhart

September 29, 1993

BEH
BRIAN E. HEARN
SUPERVISORY PRIMARY EXAMINER
ART UNIT 114